Claims

[c1]   What is claimed is:

1.A method for interpolating a pixel within an image, the image having a plurality of pixels arranged in a matrix format, the method comprising:

(a) detecting if there is an edge in a block of the image according to Discrete Cosine Transform (DCT) data of the block, within which the pixel is located;

(b) if an edge is detected, determining an interpolation direction for the pixel according to the DCT data, and interpolating the pixel according to the interpolation direction; and

(c) if no edge is detected, interpolating the pixel vertically or horizontally.

[c2]   2.The method of claim 1, wherein the DCT data comprises DCT coefficients, step (a) utilizes the DCT coefficients to detect the edge, and step (b) utilizes the DCT coefficients to determine the interpolation direction.

[c3]   3.The method of claim 2, wherein the DCT coefficients include a plurality of low frequency DCT coefficients, step (a) utilizes the low frequency DCT coefficients to detect the edge, and step (b) utilizes the low frequency

DCT coefficients to determine the interpolation direction.

[c4] 4. The method of claim 3, wherein step (b) further comprises:
determining the interpolation direction according to a lookup table corresponding to the low frequency DCT coefficients.

[c5] 5.The method of claim 3, wherein step (a) further comprises:
comparing the low frequency DCT coefficients with a threshold to detect the edge.

[c6] 6.The method of claim 3, wherein step (b) further comprises:
determining the interpolation direction according to a difference between absolute values of the low frequency DCT coefficients and according to signs of the low frequency DCT coefficients.

[c7] 7.The method of claim 2, wherein the DCT coefficients include a plurality of high frequency DCT coefficients, and the method further comprises:
(d) detecting if there are a plurality of edges having different directions in the block according to the high frequency DCT coefficients.

[c8] 8.The method of claim 7, wherein step (d) further com-

prises:

comparing the high frequency DCT coefficients with a threshold to detect the edges having different directions.

[c9]   9. The method of claim 7, wherein step (d) further comprises:

comparing an average of the high frequency DCT coefficients with a threshold to detect the edges having different directions.

[c10]   10. The method of claim 7, wherein step (d) detects the edges having different directions according to a lookup table corresponding to the DCT coefficients.

[c11]   11. The method of claim 10, wherein step (b) further comprises:

determining the interpolation direction according to the lookup table.

[c12]   12. The method of claim 7, wherein step (c) further comprises:

if no edge is detected or edges having different directions are detected, interpolating the pixel vertically or horizontally.

[c13]   13. The method of claim 1, further comprising:

(d) generating the DCT data according to raw data of the image or encoded data of the image.

[c14] 14. A device for interpolating a pixel within an image, the image having a plurality of pixels arranged in a matrix format, the device comprising:

a detection unit for detecting an edge in a block of the image according to Discrete Cosine Transform (DCT) data of the block, within which the pixel is located;

a processing unit electrically coupled to the detection unit for determining an interpolation direction of the pixel according to the DCT data and a detection result generated by the detection unit; and

an interpolation unit electrically coupled to the detection unit and the processing unit for interpolating the pixel; wherein if an edge is detected, the interpolation unit interpolates the pixel according to the interpolation direction, and if no edge is detected, the interpolation unit interpolates the pixel vertically or horizontally.

[c15] 15. The device of claim 14, wherein the processing unit is capable of detecting edges having different directions in the block according to the DCT data.

[c16] 16. The device of claim 15, wherein if no edge is detected or edges having different directions are detected, the interpolation unit interpolates the pixel vertically or horizontally.

[c17] 17. The device of claim 14, wherein the processing unit includes a lookup table corresponding to the DCT data, and the processing unit is capable of determining the interpolation direction according to the lookup table.

[c18] 18. The device of claim 14, wherein the processing unit includes a lookup table corresponding to the DCT data, and the processing unit is capable of detecting edges having different directions in the block according to the lookup table.

[c19] 19. The device of claim 14, wherein the processing unit includes a specific arithmetic unit for generating a calculation result according to the DCT data, and the processing unit is capable of determining the interpolation direction according to the calculation result.

[c20] 20. The device of claim 14, further comprising a video decoder or a video encoder electrically coupled to the detection unit for generating the DCT data.